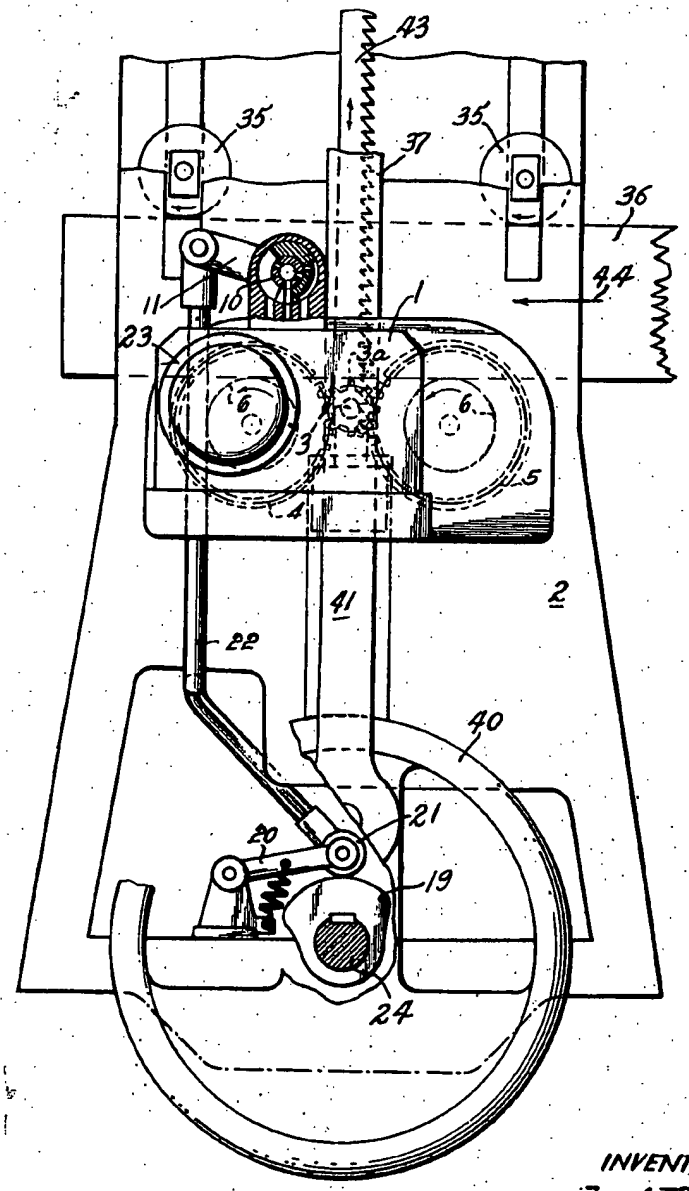
Dec. 24, 1957 J. TRABEN 2,817,375

DRIVE FOR THE FEED ROLLERS OF FRAME SAWS

Filed May 9, 1955 4 Sheets-Sheet 1

FIG. 1



INVENTOR
Josef TRABEN

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FIG. 2

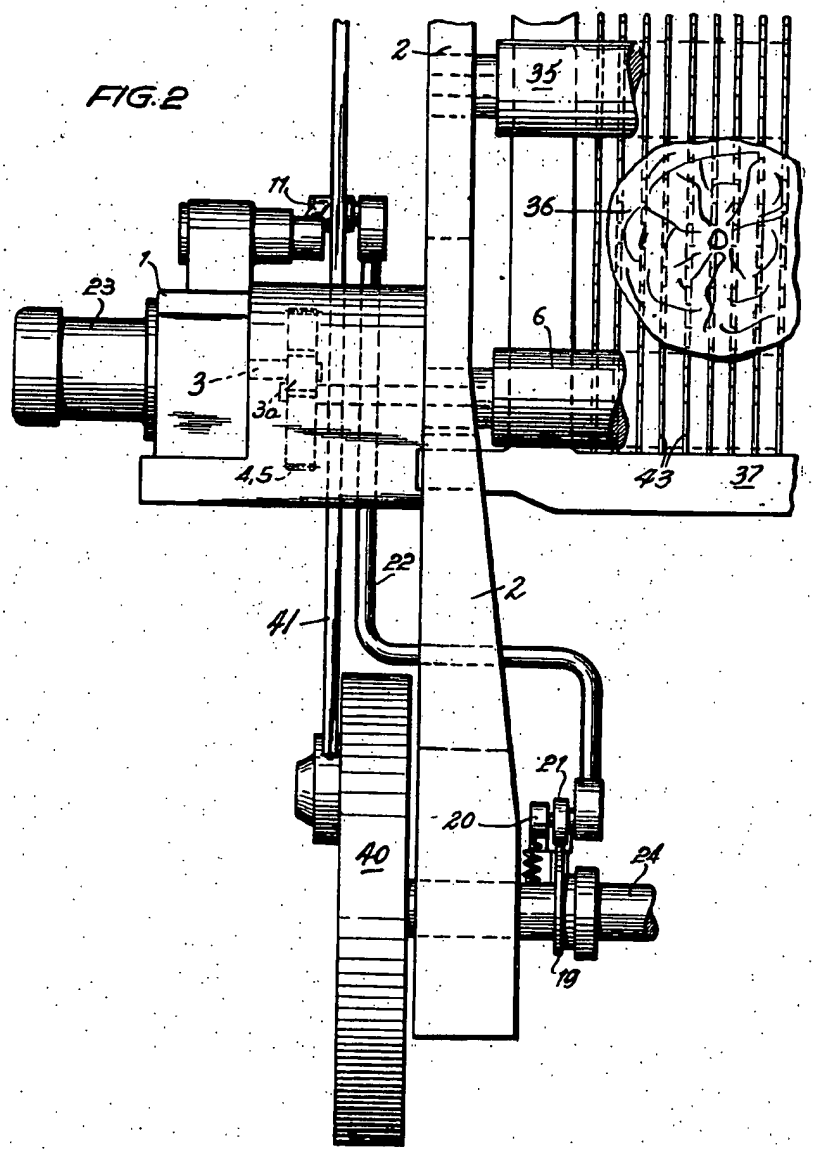

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FIG. 4

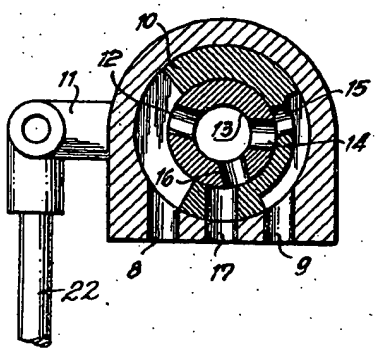


FIG. 5

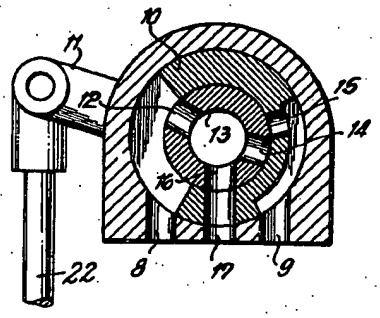
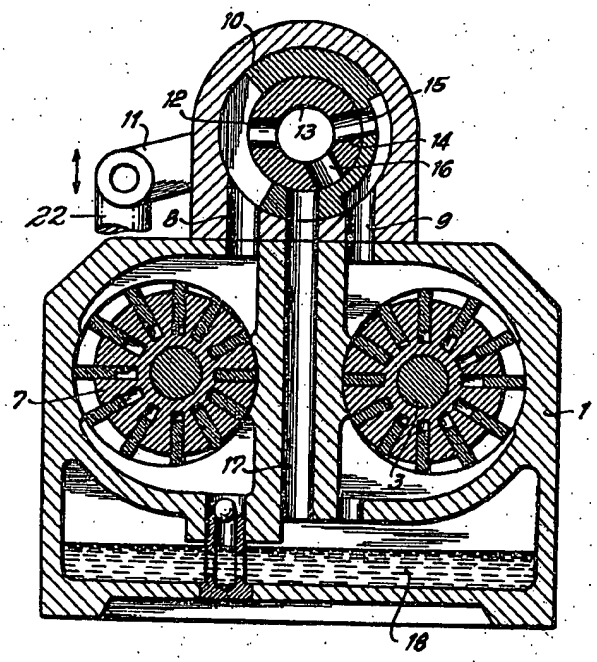


FIG. 3



INVENTOR
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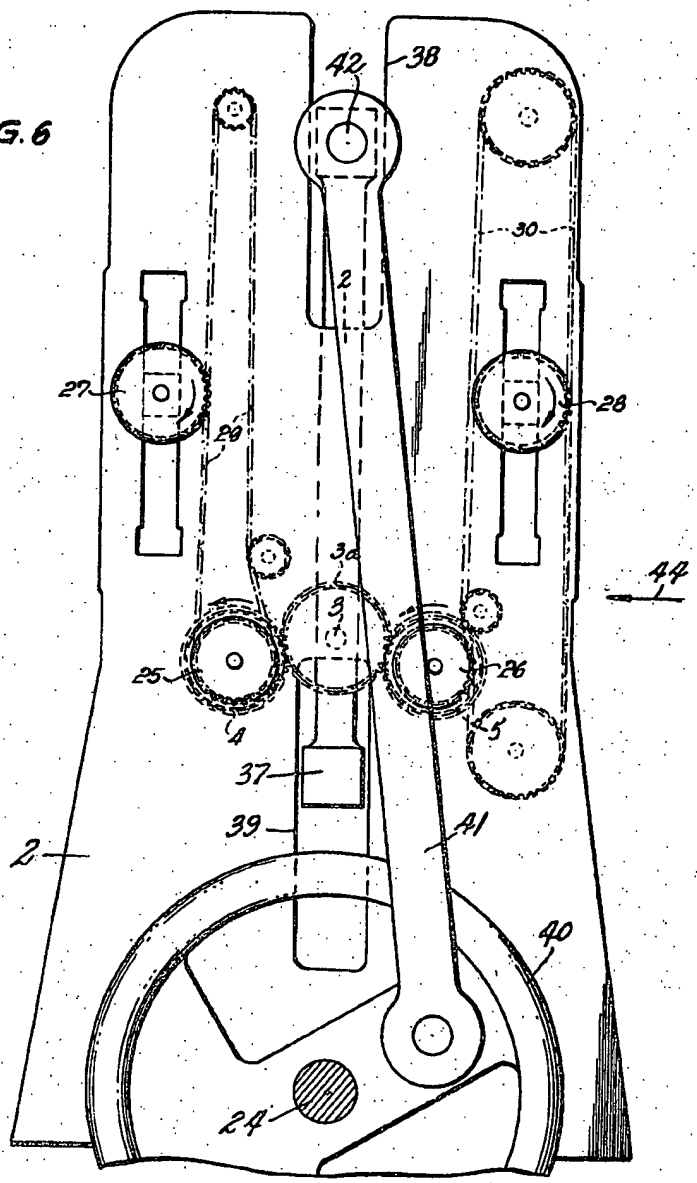
FIG. 6



INVENTOR
Josef TRABEN

United States Patent Office 2,817,375 Patented Dec. 24, 1957

2,817,375

DRIVE FOR THE FEED ROLLERS OF FRAME SAWS

Josef Traben, Oberkirch (Baden), Germany

Application May 9, 1955, Serial No. 507,065

Claims priority, application Germany July 5, 1949

1 Claim. (Cl. 143—84)

This invention relates to a drive for the feed rollers of a frame saw, which drive is controlled depending on the generally sinusoidal variations in the cutting rate of the saw blades.

Mechanical ratchet mechanisms are known for this purpose, but these mechanisms have several disadvantages. They are complicated, susceptible to breakdown, exposed to heavy wear, cannot be very finely adjusted or regulated, and are not proof against overloading.

The object of the invention is to overcome these disadvantages by driving the feed rollers by means of variable hydraulic gear which can be regulated by superimposing the variations in the cutting rates of the saw blades.

Such a drive is simply constructed, has strong resistance to wear, can be very accurately adjusted and regulated, is very reliable, operates smoothly and without shocks and at the same time very accurately, because with such gears it is possible to prevent any play, which might affect accuracy, from occurring in the power transmission simply by keeping the hydraulic medium, e. g. oil, under a suitable pressure.

The drive according to the invention can be reversed easily. The speed of rotation can be adjusted both with a constant torque and with a constant output.

The hydraulic gear preferably comprises a rotary pump and a rotary motor driven therefrom. For example, a rotary vane-type pump and motor may be used, in which as a result of eccentric mounting of the rotors, sickle-shaped spaces are formed which are subdivided into individual chambers by the radially displaceable, rotating vanes, the capacity of the chambers varying. By varying the eccentricity of the rotors it is possible to regulate the speed and direction of revolution as well as the output and torque of the rotary motor. Variation in the delivery of the pump and the capacity of the motor causes variations in the speed in both directions of rotation. The gear serves as a change-speed gear, clutch, brake and protection against overloading. As an additional protection against overloading safety valves may be provided for both directions of rotation. Reverse rotation of the feed rollers may be desired, for example, if the saws bind in the wood. Reversing takes place by reversing the direction of flow of the hydraulic medium in the gear.

The regulating device is used to regulate the basic speed of the hydraulic gear. This basic speed depends, for example, on the number and quality of the saw blades, on the nature and dimensions of the log to be cut up by the frame saw, on the maximum cutting rate of the saw blades, i. e. on the rate of reciprocation of the saw blades, and also on the rate or angle of approach of the saw blades, i. e. their angular inclination to the vertical which may, if necessary, be adjustable at will.

The regulating device alters this basic speed depending on variations in the cutting rate of the saw blades,

and may be remotely-controllable at will, e. g. from the bed of the saw (the path followed by the timber).

The regulating device may comprise a throttle member regulating the flow of the hydraulic medium in the gear, e. g. a rotary valve which is actuated by members which are controlled depending on variations in the cutting rate of the saw blades.

The variations in the cutting rate of the saw blades which control the regulating device for the hydraulic gear, may be derived, for example, from the main shaft of the frame saw causing the operating movement of the saw blades. On this shaft may be mounted, for example, a camplate shaped according to the variations in the cutting rate of the saw blades, on which camplate a follower runs to which is articulated a rod which, via a lever, moves the throttle member.

Instead of deriving the variations in the cutting rate of the saw blades from the main driving shaft of the frame saw, it is also possible to derive these variations from the frame holding the saw blades.

The pump for the hydraulic gear may, for example be driven from an electric motor, which is preferably likewise adjustable. But it is also possible to drive the pump by means of the main driving shaft of the frame-saw, preferably via regulating members.

The rotary motor of the hydraulic gear can be coupled directly to the shaft of the feed roller to be driven by it. Or the motor can be connected to this shaft through an intermediate gear. Such an intermediate gear is also an advantage, for example if the motor has to drive several shafts.

An embodiment of the invention is hereinafter described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic side view of part of the frame showing the hydraulic gear and its control derived from the main shaft of the frame, depending on the cutting rate of the saw blades.

Figure 2 is an end view of the frame shown in Figure 1, showing the flywheel and part of a feed roller;

Figures 3, 4 and 5 are diagrammatic sections through one embodiment of the hydraulic gear and its adjusting device controlled according to the cutting rate of the saw blades;

Figure 6 illustrates a power transmission from the shafts of the lower feed rollers, via sprockets and chains to the upper feed rollers.

The frame uprights 2 of the frame saw (Figs. 1 and 2) carry the lower feed rollers 6, which are driven in accordance with this invention, as well as the non-driven upper feed rollers, all of which guide the log to be sawed. The saw frame 37 reciprocates in the slide guides 38, 39 (Fig. 6) provided in the frame uprights 2. The saw frame is driven in a manner known per se from the saw's main shaft 24, over the flywheel 40, the connecting rod 41 and the cross-head 42. The saw frame 37 carries the saw blades 43 (Fig. 2) toward which the log 36 is moved by means of the feed rollers 6 in the direction shown by arrow 44 (Figs. 1 and 6).

A variable hydraulic gear 1, which comprises a hydraulic rotary pump 7 (Fig. 3), driven by an electric motor 23, and a hydraulic rotary motor, is mounted on the frame uprights 2 of the frame saw. The driven shaft 3 carries a pinion 3a, by means of which the torque is transmitted, through gearwheels 4 and 5, to the feed rollers 6.

From the working space of the pump 7 (Figures 3, 4 and 5) a conduit 8 leads, via a three-way rotary valve 10 and a conduit 9, to the hydraulic rotary motor mounted on the shaft 3. The rotary valve can be turned by means of a lever 11.

In the position shown in Figure 3, the hydraulic medium flows unhindered from the pump to the motor. The speed of the driven shaft 3 is the basic maximum speed which is determined, for example depending on the number and quality of the saws, the nature and dimensions of the timber, etc., which speed—as will be described below—has superimposed on it fluctuations in speed corresponding to the variations in the cutting rate of the saw blades.

In the position shown in Figure 4, only some of the hydraulic medium from the pump flows to the motor through the passages 8, 12, 13, 14, 15 and 9, while the rest is conveyed back to the oil chamber 18 (Figure 3) through the passages 13, 16 and 17, without being used for the transmission of power. As only some of the medium is used to drive the motor, the speed of the driven shaft 3 is less than the basic maximum speed.

In the position shown in Figure 5, all the hydraulic medium supplied by the pump is conveyed back to the oil chamber 18 through the passages 8, 12, 13 and 17, without being used for the transmission of power, because as a result of the position of the passage 14 in the rotary valve in relation to the fixed passage 15, the hydraulic medium is denied access to the motor. Accordingly, regardless of the fact that the pump is rotating at full basic maximum speed, the speed of the driven shaft 3 is zero.

The three-way rotary valve 10 is actuated by main drive shaft 24 and a cam 19. Thereby is obtained the desired degree of variability in the selection of the feed movement.

The lever 11, which moves the rotary valve 10, is in turn moved, via a rod 22 and a follower 21 (Fig. 1) which is mounted on one end thereof. The follower 21 is urged by a spring-loaded single-armed lever 20 against a cam plate 19 which is mounted on the main shaft 24 of the saw and on which the follower 21 rolls. The profile of the cam plate 19 is shaped according to the cutting rate of the saw blades. It is thereby provided for that the cam plate 19 rigidly fixed to the main shaft 24, in cooperation with the three-way rotary valve 10, allows the desired feed movement in dependence on the movement of the saw frame, in accordance with the cam plate's profile. Cam plate 19 is preferably given such a profile that the material to be sawed, such as the log 36, is moved toward the saw blades 43 each time so much that after an upward stroke which usually is the idle stroke, the material to be cut does just not yet contact the saw blade teeth. The advantage of this measure is that after the end of the upward stroke the material to be sawed is already in the proximity of the saw blades

43 so that feed time is economized. It is self-understood that through the selection of other specific profiles of the cam plate 19, any other desired feed movement depending on the movement of the saw frame and/or of the cutting power can be effected. An important general advantage of the inventive feed control apparatus consists in that the movement of the log 36 toward the saw blades 43 can be adjusted as desired or in response to technical necessities.

As shown in Figure 6, the pinion 3a mounted on the driven shaft 3, transmits the torque to the gearwheels 4 and 5, which are mounted on the shafts of the lower rollers. These shafts carry sprockets 25 and 26 which transmit the torque to the upper rollers via chains 29 and 30 and sprockets 27 and 28.

I claim:

In a frame saw having reciprocating saw blades and feed rollers for sawing a log up into a plurality of planks at one pass, the combination of a variable hydraulic gear to drive the feed rollers comprising a rotary pump, an electric motor to drive said pump, a rotary motor hydraulically driven by said pump, said rotary motor in turn driving mechanically said feed rollers, a conduit system to close the flow circuit of the hydraulic medium through said pump, said hydraulic motor and an oil chamber, a shunt conduit from said hydraulic pump directly to said oil chamber passing by said hydraulic motor, a three-way rotary valve disposed at the branch-off point of the shunt conduit, said valve distributing, in dependence on the position of its rotary element, the flow of the hydraulic medium between the conduit leading to the motor and said shunt conduit, a cam plate fixed on the main shaft of the saw frame driving the saw blades, a follower urged against said cam plate, and a mechanical connection between said follower and an operating member of said valve, said cam plate being shaped to cause the feed rollers to produce the advance of the log essential for the sawing procedure.

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